

8-5

Study Guide and Intervention

Adding and Subtracting Polynomials

Add Polynomials To add polynomials, you can group like terms horizontally or write them in column form, aligning like terms vertically. **Like terms** are monomial terms that are either identical or differ only in their coefficients, such as $3p$ and $-5p$ or $2x^2y$ and $8x^2y$.

Example 1

Find $(2x^2 + x - 8) + (3x - 4x^2 + 2)$.

Horizontal Method

Group like terms.

$$\begin{aligned} (2x^2 + x - 8) + (3x - 4x^2 + 2) \\ = [(2x^2 + (-4x^2)) + (x + 3x) + [(-8) + 2]] \\ = -2x^2 + 4x - 6. \end{aligned}$$

The sum is $-2x^2 + 4x - 6$.

Example 2

Find $(3x^2 + 5xy) + (xy + 2x^2)$.

Vertical Method

Align like terms in columns and add.

$$\begin{array}{r} 3x^2 + 5xy \\ (+) 2x^2 + xy \quad \text{Put the terms in descending order.} \\ \hline 5x^2 + 6xy \end{array}$$

The sum is $5x^2 + 6xy$.

Exercises

Find each sum.

- $(4a - 5) + (3a + 6)$
- $(6x + 9) + (4x^2 - 7)$
- $(6xy + 2y + 6x) + (4xy - x)$
- $(x^2 + y^2) + (-x^2 + y^2)$
- $(3p^2 - 2p + 3) + (p^2 - 7p + 7)$
- $(2x^2 + 5xy + 4y^2) + (-xy - 6x^2 + 2y^2)$
- $(5p + 2q) + (2p^2 - 8q + 1)$
- $(4x^2 - x + 4) + (5x + 2x^2 + 2)$
- $(6x^2 + 3x) + (x^2 - 4x - 3)$
- $(x^2 + 2xy + y^2) + (x^2 - xy - 2y^2)$
- $(2a - 4b - c) + (-2a - b - 4c)$
- $(6xy^2 + 4xy) + (2xy - 10xy^2 + y^2)$
- $(2p - 5q) + (3p + 6q) + (p - q)$
- $(2x^2 - 6) + (5x^2 + 2) + (-x^2 - 7)$
- $(3z^2 + 5z) + (z^2 + 2z) + (z - 4)$
- $(8x^2 + 4x + 3y^2 + y) + (6x^2 - x + 4y)$

8-5 Study Guide and Intervention *(continued)*

Adding and Subtracting Polynomials

Subtract Polynomials You can subtract a polynomial by adding its additive inverse. To find the additive inverse of a polynomial, replace each term with its additive inverse or opposite.

Example

Find $(3x^2 + 2x - 6) - (2x + x^2 + 3)$.

Horizontal Method

Use additive inverses to rewrite as addition. Then group like terms.

$$\begin{aligned} (3x^2 + 2x - 6) - (2x + x^2 + 3) \\ &= (3x^2 + 2x - 6) + [(-2x) + (-x^2) + (-3)] \\ &= [3x^2 + (-x^2)] + [2x + (-2x)] + [-6 + (-3)] \\ &= 2x^2 + (-9) \\ &= 2x^2 - 9 \end{aligned}$$

The difference is $2x^2 - 9$.

Vertical Method

Align like terms in columns and subtract by adding the additive inverse.

$$\begin{array}{r} 3x^2 + 2x - 6 \\ (-) \quad x^2 + 2x + 3 \\ \hline 3x^2 + 2x - 6 \\ (+) -x^2 - 2x - 3 \\ \hline 2x^2 \qquad - 9 \end{array}$$

The difference is $2x^2 - 9$.

Exercises

Find each difference.

1. $(3a - 5) - (5a + 1)$

2. $(9x + 2) - (-3x^2 - 5)$

3. $(9xy + y - 2x) - (6xy - 2x)$

4. $(x^2 + y^2) - (-x^2 + y^2)$

5. $(6p^2 + 4p + 5) - (2p^2 - 5p + 1)$

6. $(6x^2 + 5xy - 2y^2) - (-xy - 2x^2 - 4y^2)$

7. $(8p - 5q) - (-6p^2 + 6q - 3)$

8. $(8x^2 - 4x - 3) - (-2x - x^2 + 5)$

9. $(3x^2 - 2x) - (3x^2 + 5x - 1)$

10. $(4x^2 + 6xy + 2y^2) - (-x^2 + 2xy - 5y^2)$

11. $(2h - 6j - 2k) - (-7h - 5j - 4k)$

12. $(9xy^2 + 5xy) - (-2xy - 8xy^2)$

13. $(2a - 8b) - (-3a + 5b)$

14. $(2x^2 - 8) - (-2x^2 - 6)$

15. $(6z^2 + 4z + 2) - (4z^2 + z)$

16. $(6x^2 - 5x + 1) - (-7x^2 - 2x + 4)$